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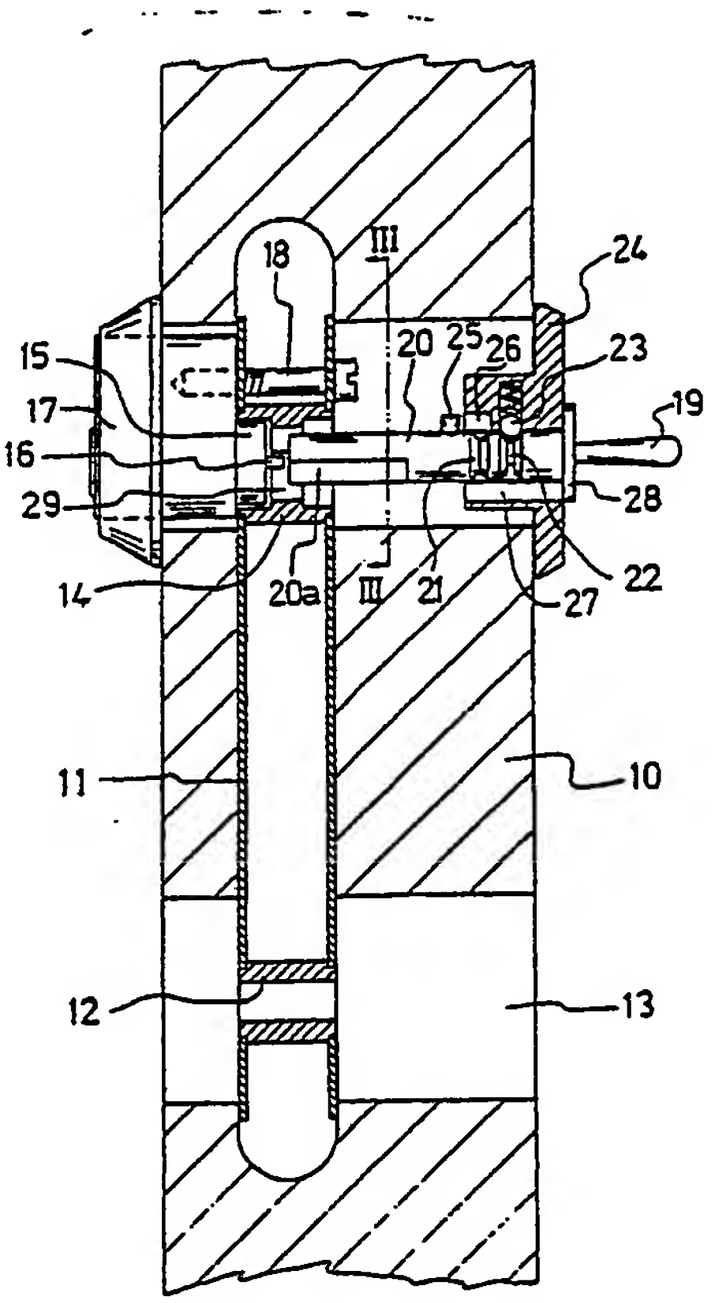
(54) Title: A LOCK HAVING A SAFETY TURNING KNOB

(57) Abstract

In order to normally permit the unlocking of the door from its inside by means of a knob, while occasionally making an un-authorized opening impossible, the knob (19) is mounted upon a driver (20), which may be axially displaced into and out of engagement, respectively, with a rotatable member (14) in the lock. When the driver is retracted from the rotatable member, a radially directed peg (25) will be introduced into a groove (26) in a washer (24), in which the driver is journalled, which prevents rotation of the driver and the knob. The driver is provided with peripheral grooves (21, 22), which in co-operation with a spring loaded ball (23) form end portion stops for the driver. One (22) of these grooves is deeper than the other, and defines a breaking indication. An un-authorized activity at the knob will destroy the driver, but leaves the lock unharmed.



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A LOCK HAVING A SAFETY TURNING KNOB

For many years the insurance companies and various authorities have asked for better burglarproof locks (this also including means to prevent an entrance door being opened from the inside without the aid of a key). A lock which is in regular use must be easily operated. A special feature is that it shall be convenient for the occupants, i.e. there should be a possibility to lock and unlock from the inside, without the aid of a key. The fire control authorities may request that there must be a way to rapidly unlock a door, which may mean without the aid of a key (which may have been removed and mislaid).

Safety convenience for occupants at home is often obtained by means of a lock, which is operable from inside the door by a knob. This type of lock will fullfil the requirements of the fire control authorities concerning a rapid and safe evacuation.

Safety when away from home means that the door is locked by a lock of accepted type, for instance a 7-lever tumbler lock, which cannot be unlocked without the aid of the proper key, neither from the inside, nor from the out-side. It is also possible to use a cylinder lock of non-pilferable type, but the door must then have a cylinder at its inward face, as well as at its outside face (i.e. there is no knob at the inside).

Many attempts have been made to combine the two safety aspects. It is thus possible to have a cylinder which is operable by a key from the outside and by a knob from the inside, together with a 7-lever tumbler lock. It is further possible to have a two-function lock comprising a cylinder lock with a knob at the inside of the door, as well as a 7-lever or 9-lever tumbler lock. These solutions are satisfactory from the point of view of the fire control authorities, under the condition that the tumbler lock is not

locked from the inside, or, if locked, that the key remains in the lock. These solutions are, however, not fully comfortable as they will require a rather big extra key (to the tumbler lock). About the same action is obtainable by a non-pilferable cylinder lock operable by a key from both ends. Also this solution will satisfy the fire control authorities, but only if the key is always left in the lock, when someone is at home. This solution is convenient as it is not necessary to carry an extra key along, but on the other hand one must remember to insert the key at the inside of the door, and permit it to remain there, as long as someone is at home.

The aim of the present invention is to satisfy the requirements of the insurance companies, of certain authorities, including the fire control people, as well as the user, concerning a device, which can be used with most kinds of cylinder locks, and certain types of spanjolette locks adapted to mount a locking cylinder. The device includes a knob, here called a safety knob, which is mounted at the inward face of the door instead of an inner lock cylinder. This knob will satisfy the requirements of the insurance companies and some authorities concerning safety when away from home, as well as the requirements of the user and of the fire control authorities concerning a rapid evacuation.

A lock according to the invention includes a member rotatable within a limited angle of turning, actuating a displaceable bolt and the invention is characterized in that the safety knob is fitted at a driver, which is axially displaceable between two end positions, of which one permits engagement with the rotatable member, whereas the other implies disengagement from the latter, rotation of the member blocking re-engagement.

The driver is preferably provided with end position markings comprising at least one peripheral groove for cooperation with a catching device, the groove defining a breaking indication.

The driver is advantageously provided with two periphe-

ral grooves adapted to co-operate with a spring loaded ball catching device for determining the end positions. The driver may be mounted in a journalling washer and is provided with a flange of sufficient size to cover at least two screws securing the washer. The washer is advantageously, at its inward face, provided with a recess into which a radially directed peg at the driver is introduceable, when the safety knob is brought to its other end position.

The lock may include a lock member fitted at the inside of the door and operable by a key, the lock member by way of a spring loaded slide optionally engaging a groove in the driver. The slide may be provided with a recess for the reception of a radially directed peg at the driver, when the safety knob has been brought to its other end position, but the slide may also be formed, upon displacement of the driver, directly to engage a perihperal groove in the latter.

The invention will below be described with reference to the accompanying drawings, in which

Figure 1 shows a vertical section through a portion of a door provided with a lock according to the invention, and with the safety knob in engaged position,

Figure 2 shows the same section, but with the safety knob in withdrawn, disengaged position,

Figure 3 shows a section along line III - III in Figure 1,

Figure 4 shows a corresponding section along line IV - IV in Figure 2, and with the rotatable member turned 90^{o},

Figure 5 shows a side view of the safety knob, as viewed from the inward face of the door,

Figure 6 shows how a journalling washer for the safety knob is mounted at the outer ring of the lock cylinder,

Figures 7 a,b,c, show portions around the rotatable member, with the safety knob engaged ("at home" position),

Figures 8 d,e,f, show the same portions with the safety

knob retracted ("away from home" position),

Figure 9. shows a section through the housing of a lock, modified with an extra lock at the inward face of the door,

Figure 10 is a plan view of a slide forming part of aforementioned lock housing, as well as surrounding components,

Figure 11 shows a section along line XI - XI in Figure 9, and

Figures 12 and 13 show views corresponding to those of Figures 9 and 10, but belonging to a further modified embodiment.

In the embodiment according to Figures 1 and 2, reference 10 denotes a portion of a door leaf, into which a lock housing 11 is recessed. The lock includes a rotatable member 12, adapted to receive the square-section peg of a handle, wich in a well known manner (not shown) is fitted in a bore 13 in the door leaf.

The lock housing includes a further rotatable member 14, which in known manner (not shown) is actuated by a bolt and is operated by a key by way of a cylinder lock 15 accessible from the outward face of the door. The cylinder is provided with a projecting tongue 16, which constantly engages the hourglass-shaped recess in the rotatable member 14.

The cylinder lock is in the usual manner secured to the lock housing by means of two screws 18, and is externally protected by an outer ring 17, which is held by screws 30, accessible from the inward face of the door, and at a later stage covered by a flange 28 at the safety knob.

At the inward face of the door there is, in a conventional manner, a knob 19, by means of which the rotatable member 14 may be activated. The aim is, however, that this knob, under certain circumstances may be put out of action, so it will prevent an undesirable unlocking of the door from its inside.

The knob 19 is mounted upon a cylindrical driver 20, the distal end 20a of which is shaped for engagement with

the opening 29 of the rotatable member 14. The length of the driver 20 permits it to satisfactorily engage the rotatable member, when the knob is pushed fully inwards.

The driver is provided with two peripheral grooves 21 and 22, which co-operate with a spring loaded ball catch 23, and determine the two end positions of the axial displacement of the driver. The outward groove 22 is deeper than the inward one, and provides a breaking indication, which ensures that the retracted knob 19 will be severed from the driver if subjected to forcefull action. The driver will then remain un-accessible.

The driver 20 is journalled in a washer 24, and is provided with a sidewardly directed peg 25. At the inward face of the journalling washer there is a short groove 36, adapted to receive the peg 25, when the safety knob is retracted. Hereby the driver will be non-rotately held in the retracted position.

The journalling washer 24 is further provided with a through passage 27, having the same breadth as the peg 25. During the mounting of the driver the latter will be pushed through the journalling washer in a 180° turned position, i.e. with the peg 25 directed downwardly, so it can pass inwards through the passage.

The knob is provided with a flange 28 (see also Figure 5), which has such an extension that it will cover the groove 27, as well as the screws holding the journalling washer 24.

Figures 3 and 4 show a section through the driver 20, as viewed towards the rotatable member 14. The characteristic shape of the opening 29 therein should be noted, as well as the corresponding distal end portion 20a of the driver. The lock cylinder is secured to the lock housing 11 by means of screws 18, and is outwardly covered by a ring 17, which, in turn, is secured by means of the screws 30 in a manner which is better shown in some of the following figures.

Figure 3 shows the driver engaging the rotatable member 14, and Figure 4 shows the driver retracted therefrom, the

rotatable member having been turned ninety degrees by means of a key.

Figure 5 shows the knob 19, as viewed towards the inward face of the door, and it is evident that the flange 28 has such an extension, that it covers the screws 30 as well as the groove 27. The screws 30 can advantageously be of the "one-way"-type, i.e. they can easily be screwed in, but cannot be screwed out again. Even if the driver should break at groove 20, it is impossible to remove the screws 30 without a considerable input of tools and labour.

How these screws hold the journalling washer 24 to the outer ring 17 is evident from Figure 6.

As is mentioned above it is desirable, normally to operate the lock from the outside by means of a key, and from the inside by means of the knob. On certain occasion, namely when nobody is at home, the one who leaves last will lock the door from the outside, after having withdrawn the knob to an inactive position.

Figure 7 shows three different basic positions for a normal "at home" activity. In Figure 7a the door is unlocked - the locking tongue 16 as well as the knob 19 remain in horizontal positions.

In Figure 7b, the door has been locked from the inside, which is indicated by the vertical position of the knob.

Figure 7c shows how the lock has been locked by a key 31. The driver, which is in engagement with the rotatable member will turn the knob to its vertical position. It is evident that it will be possible to unlock by means of a key from the outside in the situation illustrated in Figure 7b, as well as to unlock by means of the knob 19 in the situation illustrated in Figure 7c.

Figure 8 shows some possible positions where the knob has been retracted from engagement whith the rotatable member. Figure 8d corresponds to unlocked position, i.e similar to Figure 7a, but with the key 31 introduced. In Figure 8a, the key has been turned 90^{o}, so the bolt has been projected, while the knob remains in its horizontal position.

According to Figure 8f the key has been turned back again, and the door is now locked, and cannot be opened, except by a key. The opening 29 in the rotatable member has been brought to a position, where it is impossible to re-introduce the driver axially, and the position of the peg 25 in the groove 26 prevents a rotation of the driver.

Against such a locking arrangement certain objection may be raised, notably that someone unintentionally could lock someone into the house. The first mentioned person may retract the knob in absence of mind, or believing that nobody remains at home.

The occurence of such a possibility must be judged against the locking of the door from the inside, whereupon the key is removed - intentionally or unintenionally, and cannot be found in a situation of panic, for instance in the case of fire.

In order to meet all possibilities an extra lock may be fitted at the inward face of the door, preferably actuable by the same key operating the main lock from outside the door. The "at home" convenience is then available by means of the knob, but in case of need the knob can be unlocked by a key from the inside.

Two embodiments permitting such action are shown in Figures 9 - 13, in which earlier reference numerals are used, whenever applicable.

With the embodiment according to Figures 9 - 11 the journalling washer 24a is adapted to receive a further lock 35 operable from the inside. The driver 36 of this lock co-operates, by way of a simple rotatable member 37, and a peg 38, with an up and down displaceable slide 39. This is biased by springs 40 towards an engagement with the driver 20.

The end of the slide turned towards the driver is forked, so it can enclose the driver, and it is provided with a central notch 41 for the peg 25 at the driver.

Figure 9 shows how the peg 25, also when the driver is pushed fully inwards, is located within the journalling washer 24a. The groove 42 in the latter has the same

location as the groove 26 in the embodiment according to Figures 1 and 2, but here has an angular extension of 180°, in the manner shown in Figure 11. This makes it possible for the safety knob 19 to perform the necessary turning action for locking and unlocking, respectively, (90° to each direction).

For the sake of clarity the slide 39 is in Figure 10 shown as being lifted by the lock 35, but normally the slide will be forced against the driver by the springs 40, when the driver 20 is retracted.

By the aid of a key in the lock 35 it is, however, possible to lift the slide 39 out of engagement with the driver 20, which can then be rotated to a suitable position for introduction into the opening 29 in the rotatable member 14, so it can be axially displaced for engagement therewith.

With the modified embodiment according to Figures 12 and 13 it is necessary always to lift the slide 39a in order to displace the driver 20 in one direction, namely when the driver 20 shall be brought into engagement with the rotatable member 14. The driver is provided with a groove 46, which in the pushed-in position of the driver co-operates with a spring loaded catch 45. Instead of the peg 25, a snap ring 47 is fitted in a groove, and determines the retracted position.

The end part of the slide 39a is provided with an arcuate recess 48 mating with the groove 46. The recess has so narrow a gap, that the slide must be held in lifted position (Figure 13), so the portions of the slide outside the gap may be brought to rest upon the slide.

When it is desirable to secure the lock in "away from home" position the knob is retracted until the snap ring 47 upon the driver comes into contact with the journalling washer 24b. The end portion of the slide 39a will slide along the driver and will finally snap into the groove 46. This extends all around the driver, so the knob 19 can rotate freely, but cannot be displaced axially. An unlocking can of course be brought about from the inside by

means of a key, so the driver 20 can be rotated to the proper position and then be pushed into engagement with the rotatable member 14.

The two last-mentioned embodiments will only be used when it is desirable to prevent an unintentional locking-in of a person having access to a door key. The embodiment according to Figures 9 - 11 is a pure safety application, which, hopefully, shall never be used, but may be required, for instance by the fire control authorities. The embodiment according to Figures 13 and 13 requires some activity each time an "away from home" securing shall be transferred into the conventionl "at home" activity.

The embodiments described above and shown in the drawings are examples only of the invention, and the details thereof may be varied in many ways within the scope of the accompanying claims depending upon the type of lock used.

CLAIMS

1. A lock having a safety turning knob at the side of the lock mechanism (15) remote from that operable by a key, the lock, in a manner known per se, including a member (14) rotatable within a limited angle of turning, c h a r a c t e r i z e d in that the safety knob (19) is fitted at a driver (20), which is axially displaceable between two end positions (21, 22), of which one (22) permits engagement with the rotatable member (14), whereas the other implies disengagement from the latter, rotation of the member blocking re-engagement.

2. A lock according to claim 1, c h a r a c t e r i z e d in that the driver (20) is provided with end position markings comprising at least one peripheral groove (24, 26) for co-operation with a catching device (23, 39, 39a), the groove defing a breaking indication.

3. A lock according to claim 2, c h a r a c t e r i z e d in that the driver (20) is provided with two peripheral grooves (21, 22) adapted to co-operate with a spring loaded ball catching device (23) for determining the end positions.

4. A lock according to claim 2, c h a r a c t e r i z e d in that the driver is provided with a perihperal groove (46) for co-operation with a spring loaded ball catching device (45) for determining the first end position, as well as with a further groove housing a snap ring (47) for determining the other end position.

5. A lock according to either of the preceding claims, c h a r a c t e r i z e d in that the driver (20) is mounted in a journalling washer (24) and is provided with a flange (28) of sufficient size to cover at least two screws (30) securing the washer.

6. A lock according to claim 5, c h a r a c t e r i z e d in that the washer at its inward face is provided with a recess (26) into which a radially directed peg (25) at the driver is introducable, when the safety knob is brought to its other end position.

7. A lock according to either of claims 1 - 4, c h a r a c t e r i z e d in a lock member (35) fitted at the inside of the door and operable by a key, the lock member by way of a spring loaded slide (39, 39a) optionally engaging a groove (21, 46) in the driver.

8. A lock according to claim 7, c h a r a c t e - r i z e d in that the slide (39) is provided with a recess (41) for the reception of a radially directed peg (25) at the driver, when the safety knob has been brought to its other end position.

9. A lock according to claim 7, c h a r a c t e - r i z e d in that the slide (39a) is formed, upon displacement of the driver (20), directly to engage a peripheral groove (46) in the latter.

AMENDED CLAIMS
(received by the International Bureau on 11 April 1984 (11.04.84))

(AMENDED) 1. A lock having a key operated cylinder as well as a safety turning knob at the side of the lock mechanism (15) remote from that operable by the key, the lock in a manner known per se, including a member (14) rotatable within a limited angle of turning between open and closed position, the safety knob (19) being fitted at a axially displaceable driver (20), c h a r a c t e r i z e d in means (21-23; 39, 45, 46) for holding the driver (28) in either of two end positions (21, 22) of which one (22) permits engagement with the rotatable member (14), whereas the other implies disengagement from the latter and preventing rotation of the driver, whereupon rotation of the member (14) to locked position will block axial displacement of the driver (20).

2. A lock according to claim 1, c h a r a c t e - r i z e d in that the driver (20) is provided with end position markings comprising at least one peripheral groove (24, 26) for co-operation with a catching device (23, 39, 39a), the groove defing a breaking indication.

3. A lock according to claim 2, c h a r a c t e - r i z e d in that the driver (20) is provided with two peripheral grooves (21, 22) adapted to co-operate with a spring loaded ball catching device (23) for determining the end positions.

4. A lock according to claim 2, c h a r a c t e - r i z e d in that the driver is provided with a perihpe- ral groove (46) for co-operation with a spring loaded ball catching device (45) for determining the first end posi- tion, as well as with a further groove housing a snap ring (47) for determining the other end position.

5. A lock according to either of the preceding claims, c h a r a c t e r i z e d in that the driver (20) is mounted in a journalling washer (24) and is provided with a flange (28) of sufficient size to cover at least two screws (30) securing the washer.

6. A lock according to claim 5, c h a r a c t e - r i z e d in that the washer at its inward face is provided with a recess (26) into which a radially directed peg (25) at the driver is introducable, when the safety knob is brought to its other end position.

7. A lock according to either of claims 1 - 4, c h a r a c t e r i z e d in a lock member (35) fitted at the inside of the door and operable by a key, the lock member by way of a spring loaded slide (39, 39a) optionally engaging a groove (21, 46) in the driver.

8. A lock according to claim 7, c h a r a c t e - r i z e d in that the slide (39) is provided with a recess (41) for the reception of a radially directed peg (25) at the driver, when the safety knob has been brought to its other end position.

9. A lock according to claim 7, c h a r a c t e - r i z e d in that the slide (39a) is formed, upon displacement of the driver (20), directly to engage a peripheral groove (46) in the latter.

FIG. 1

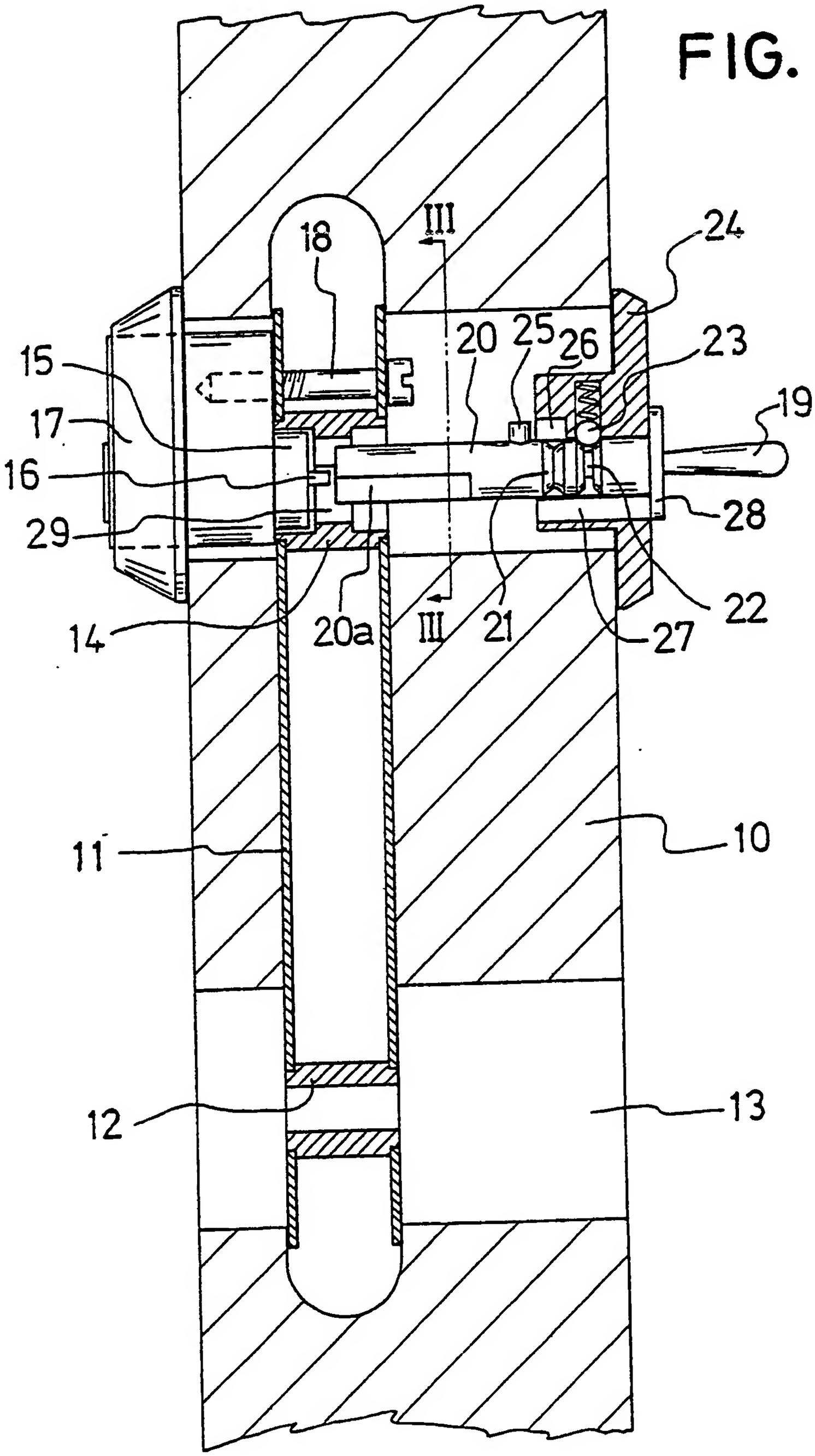

FIG. 2

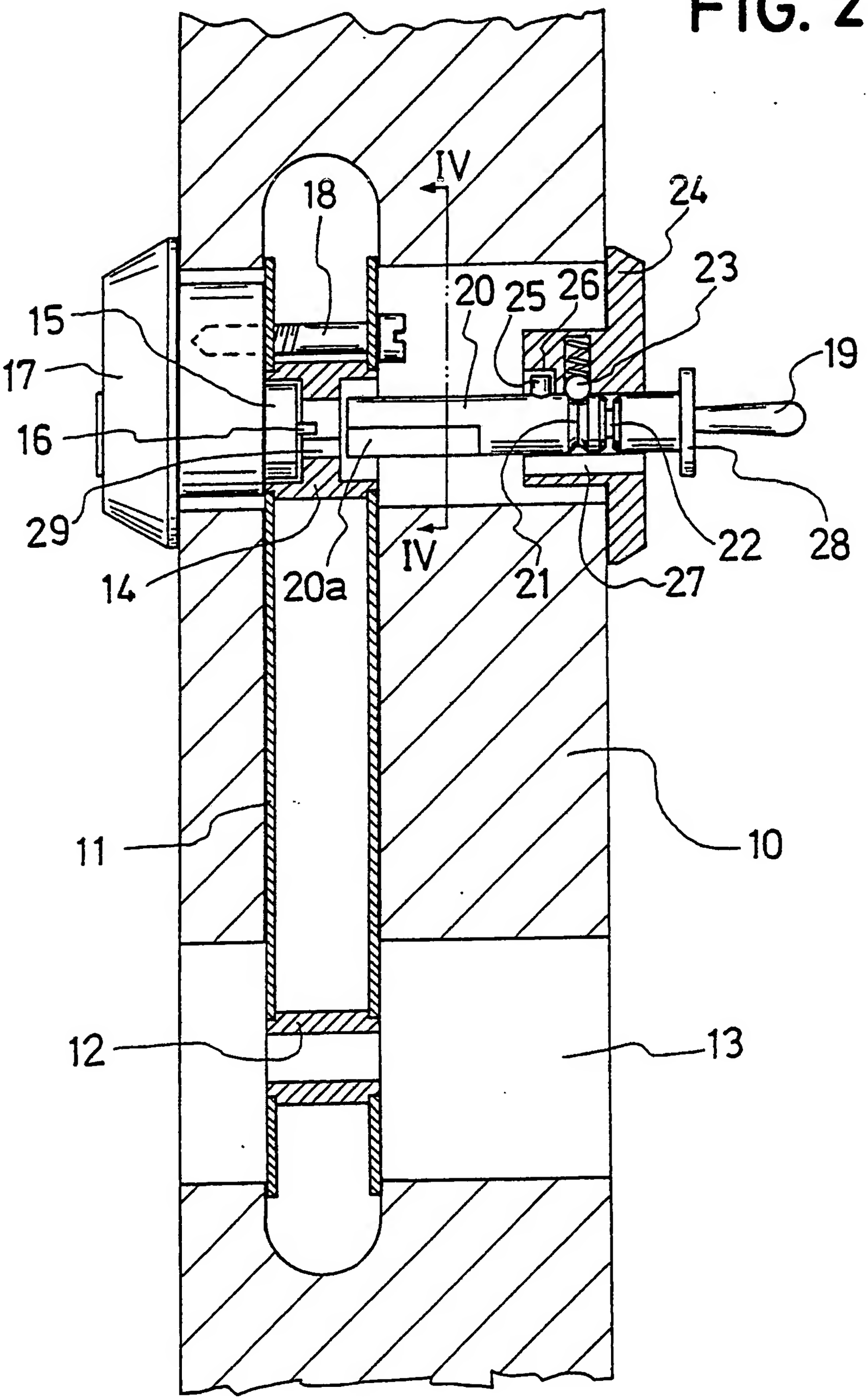

FIG. 3

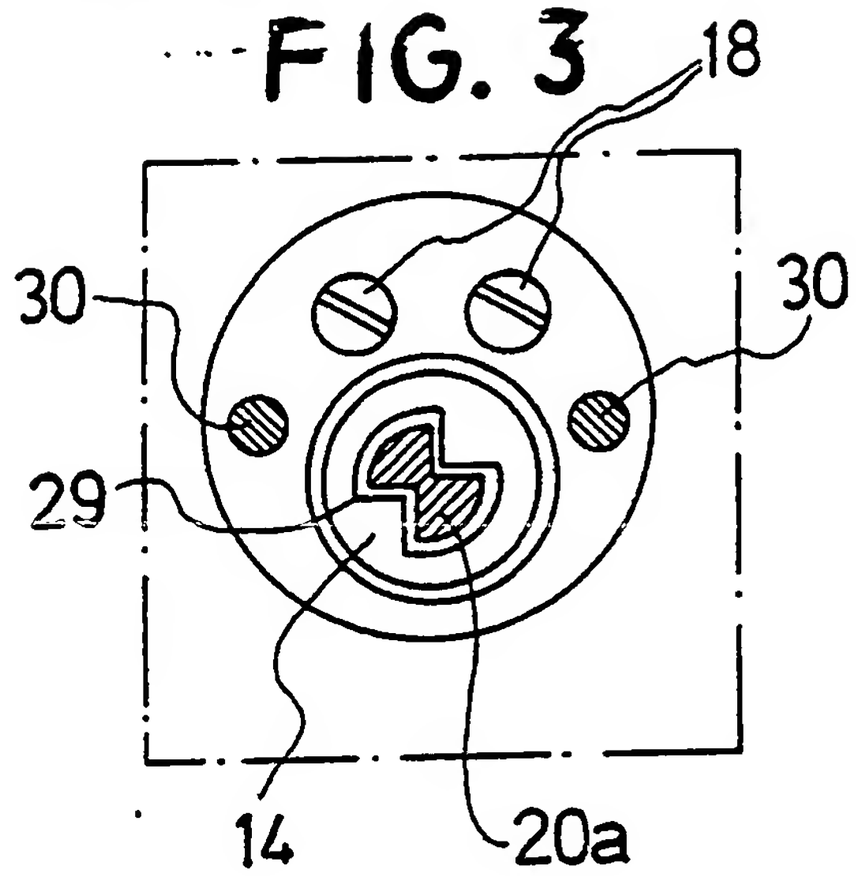

FIG. 4

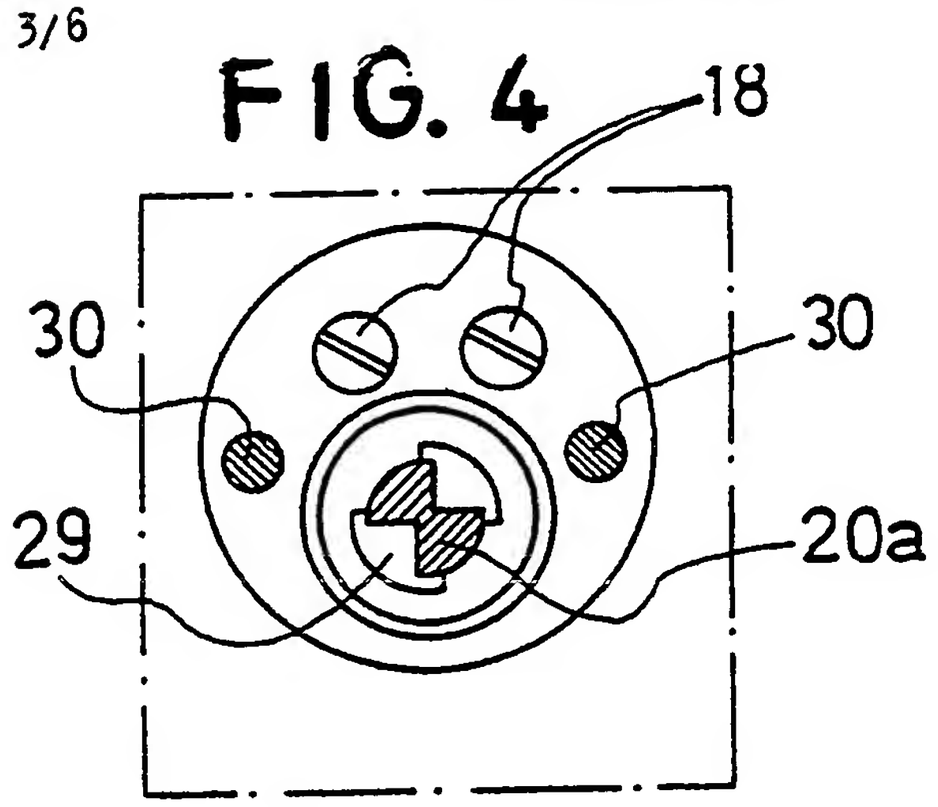

FIG. 5

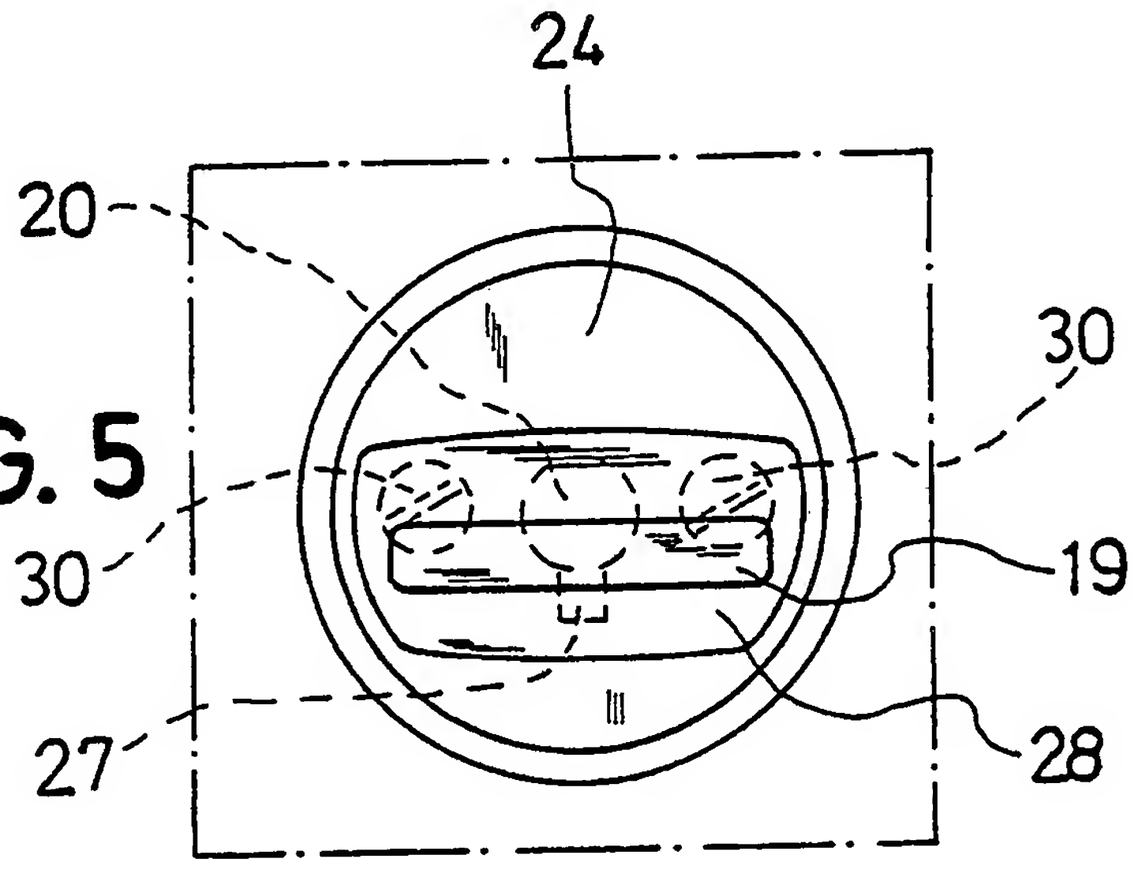

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FIG. 6

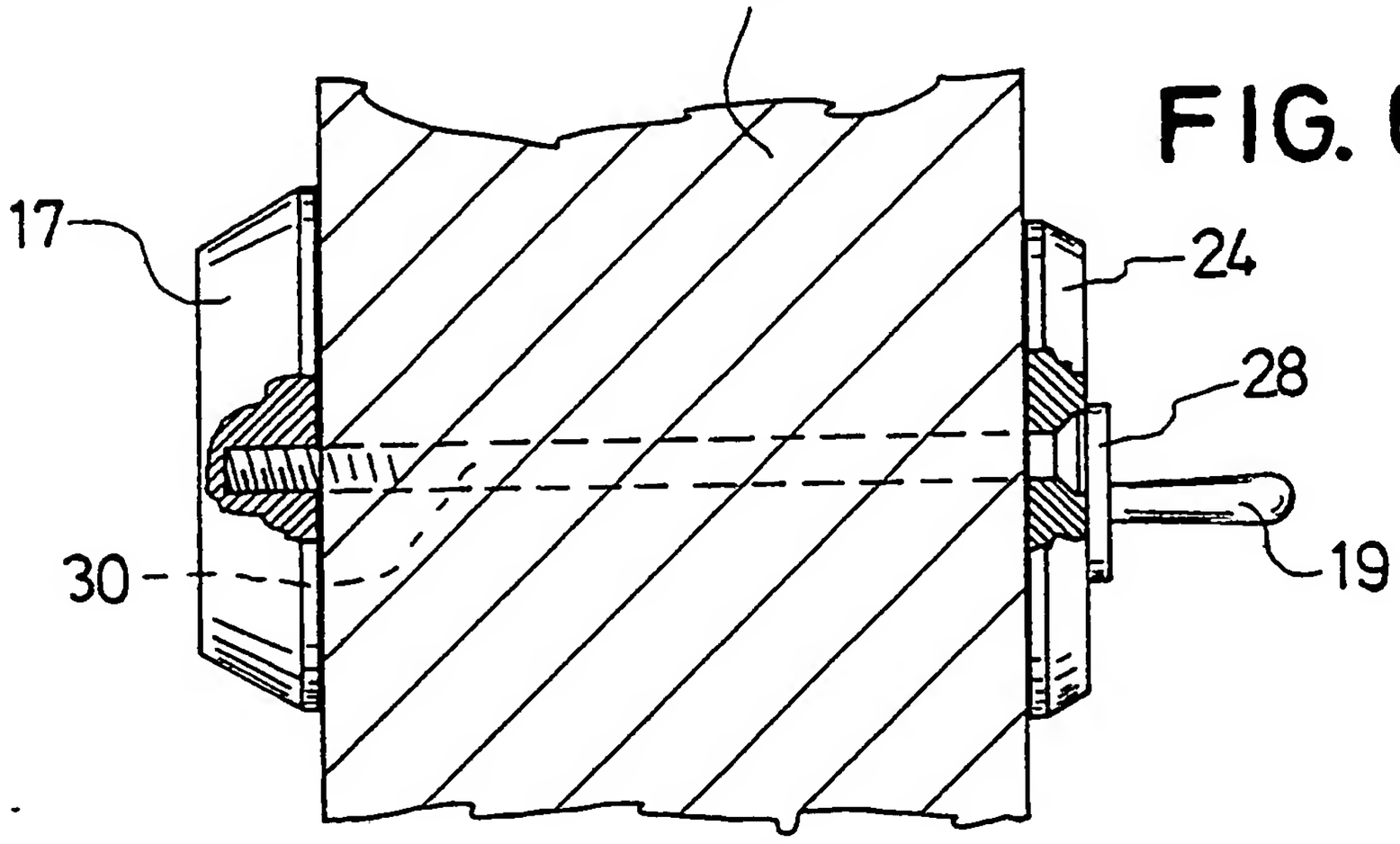


FIG. 7

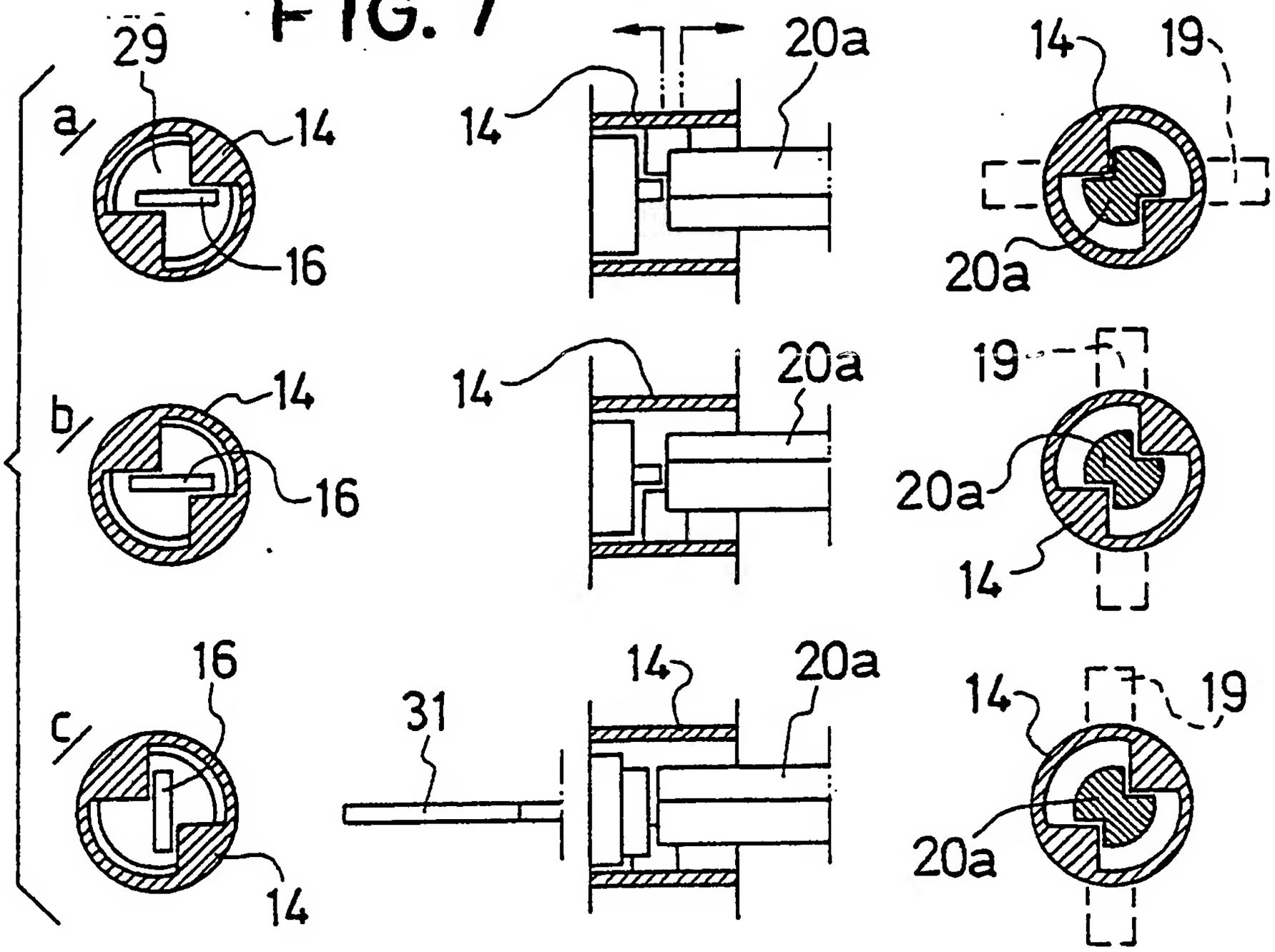


FIG. 8

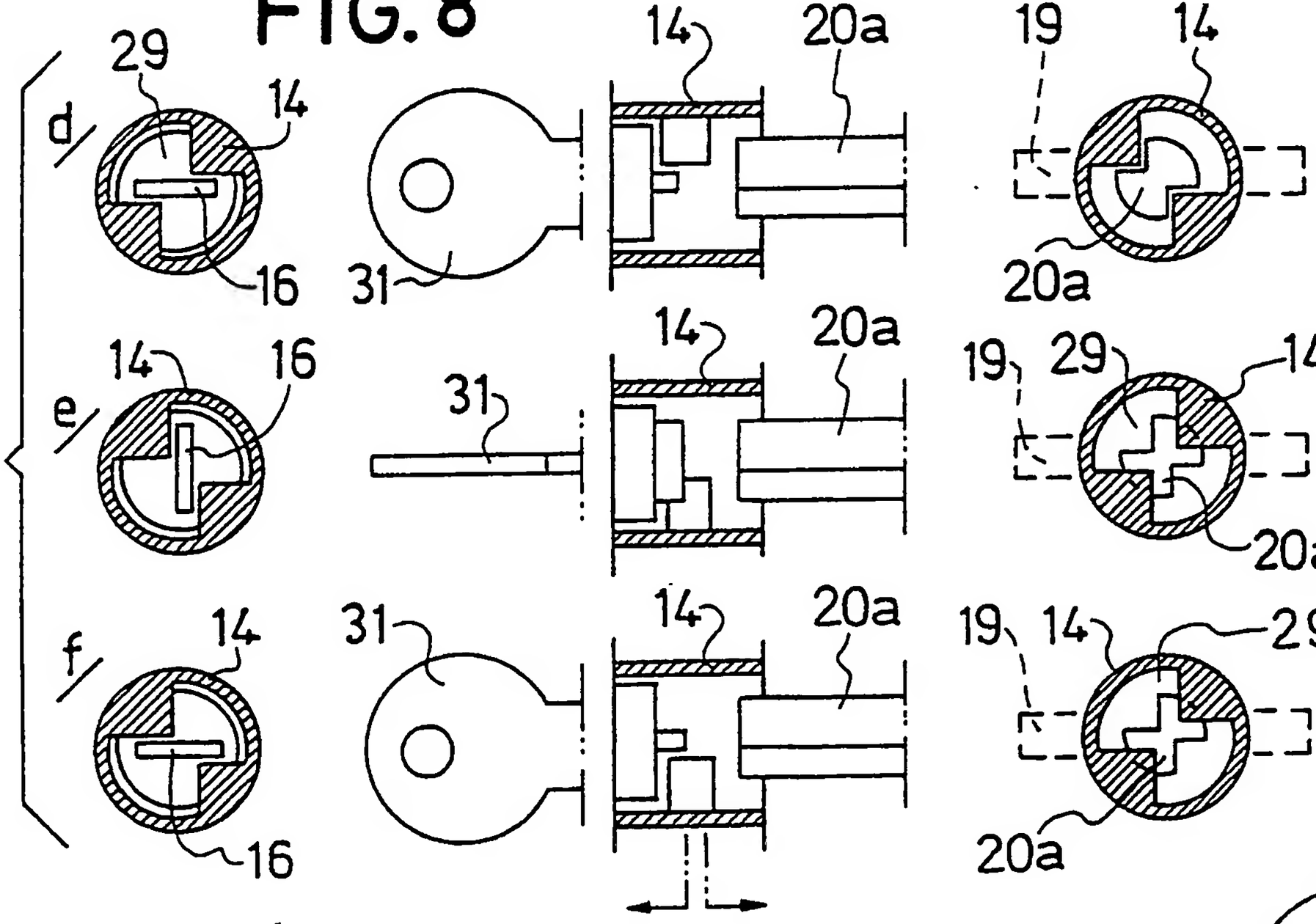


FIG. 9

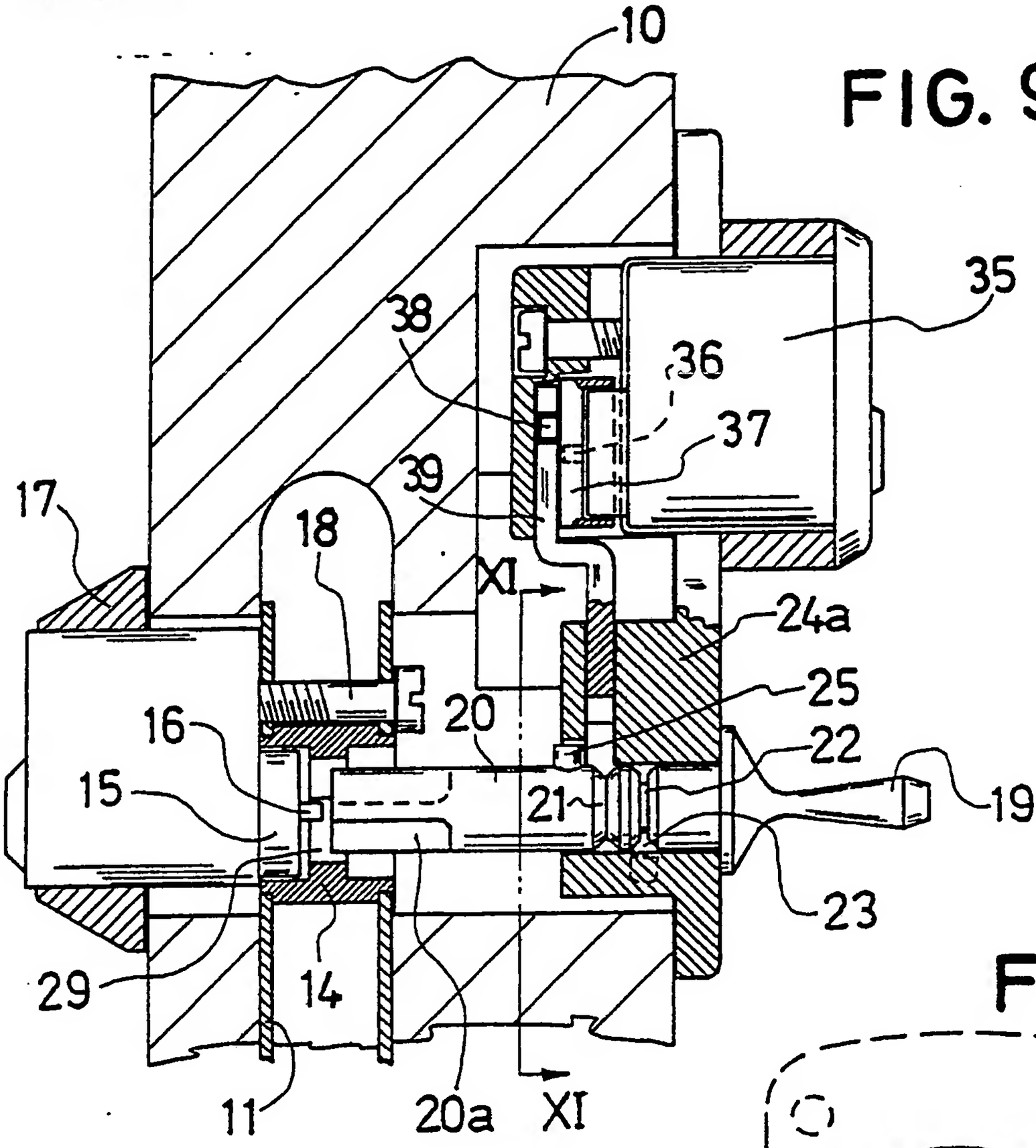


FIG. 10

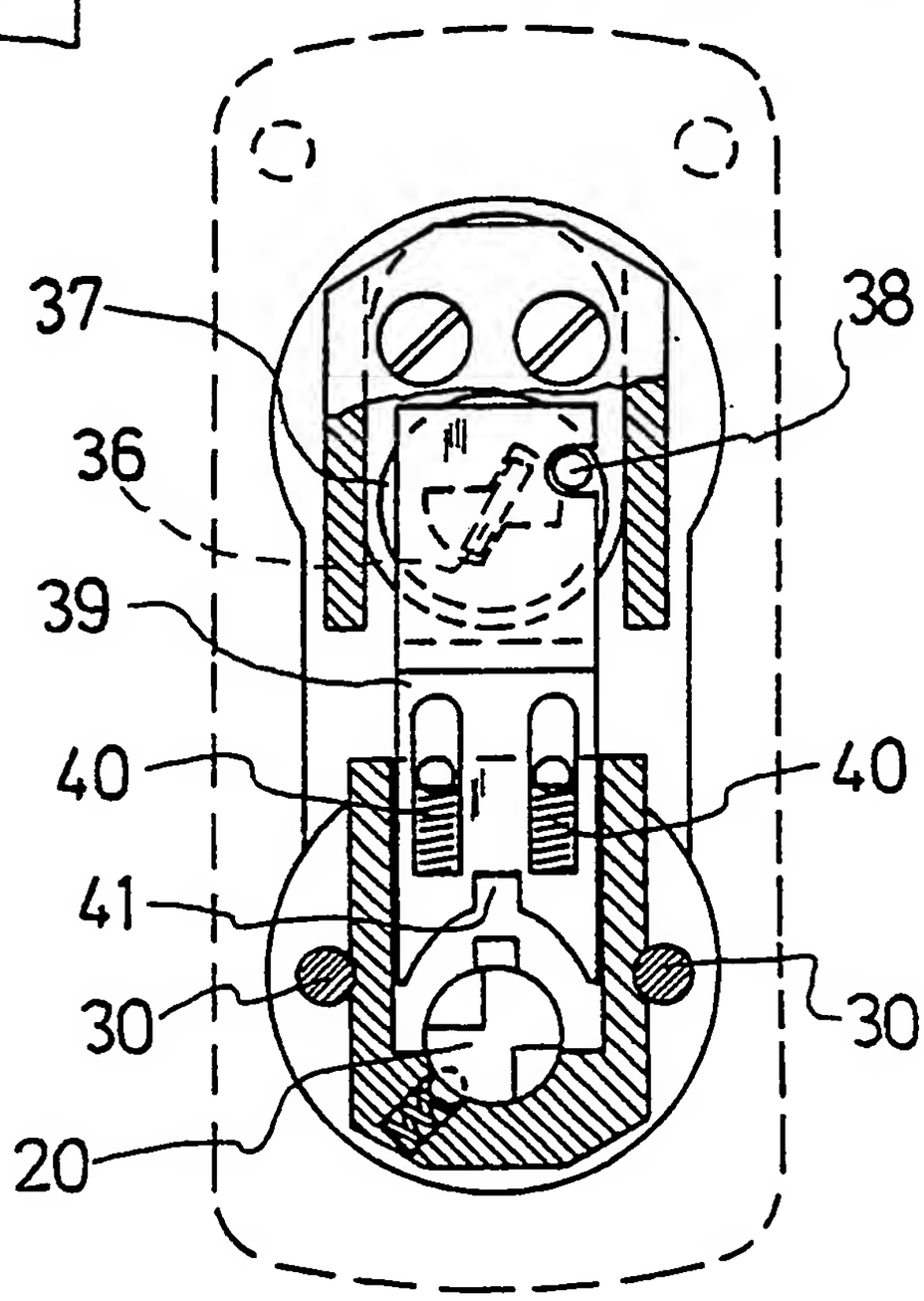


FIG. 11

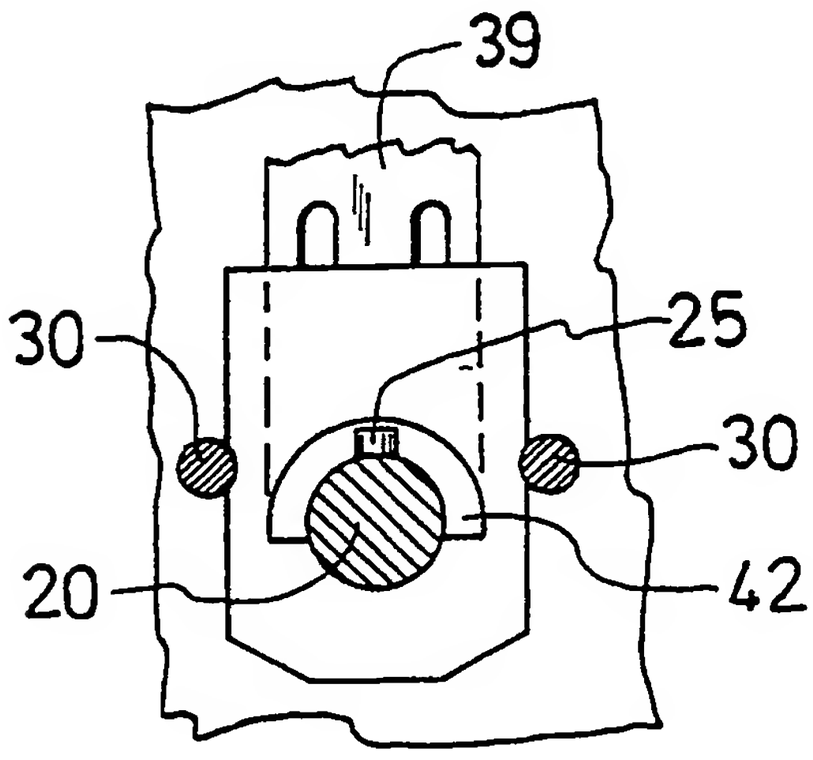


FIG. 12

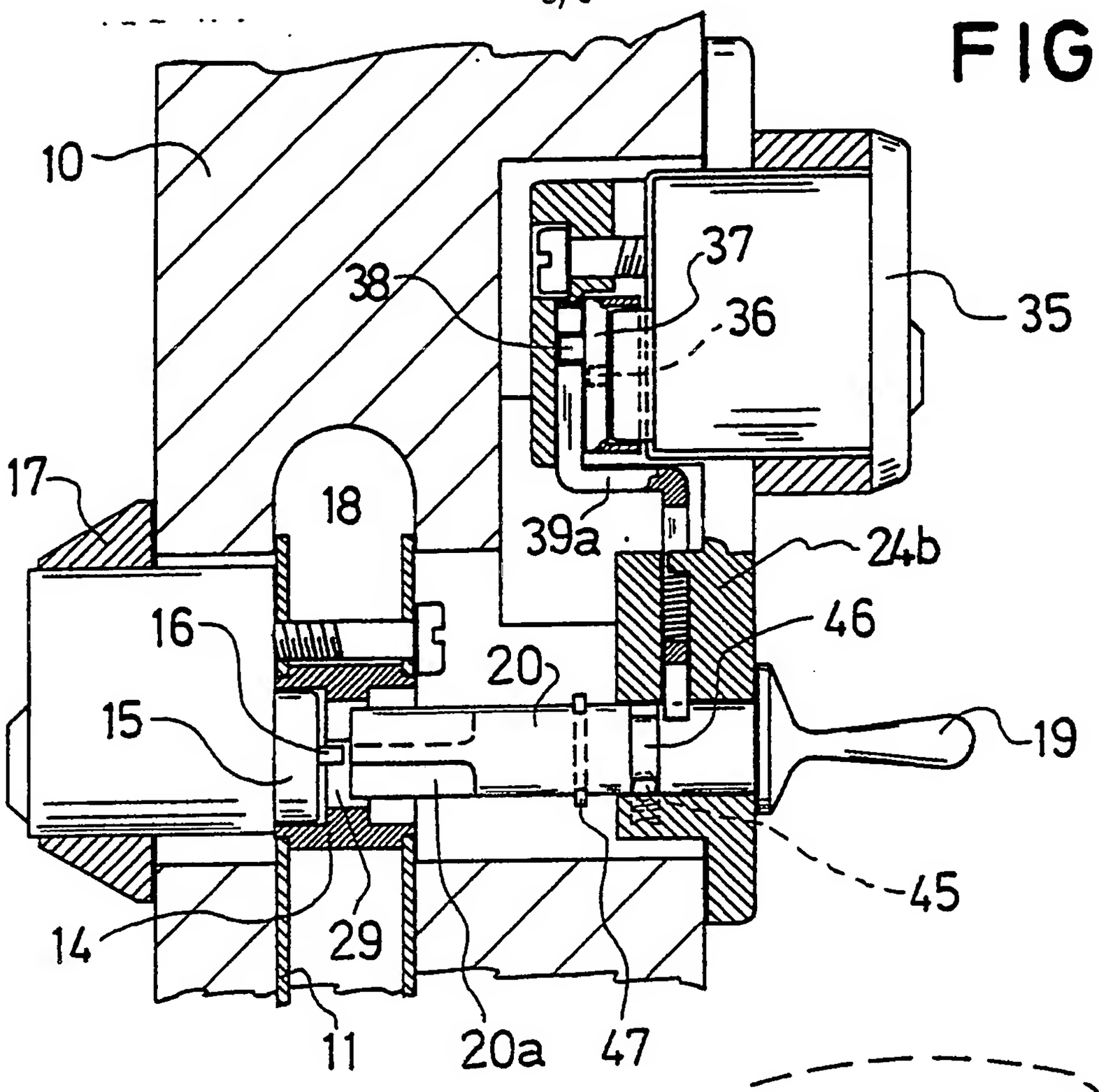
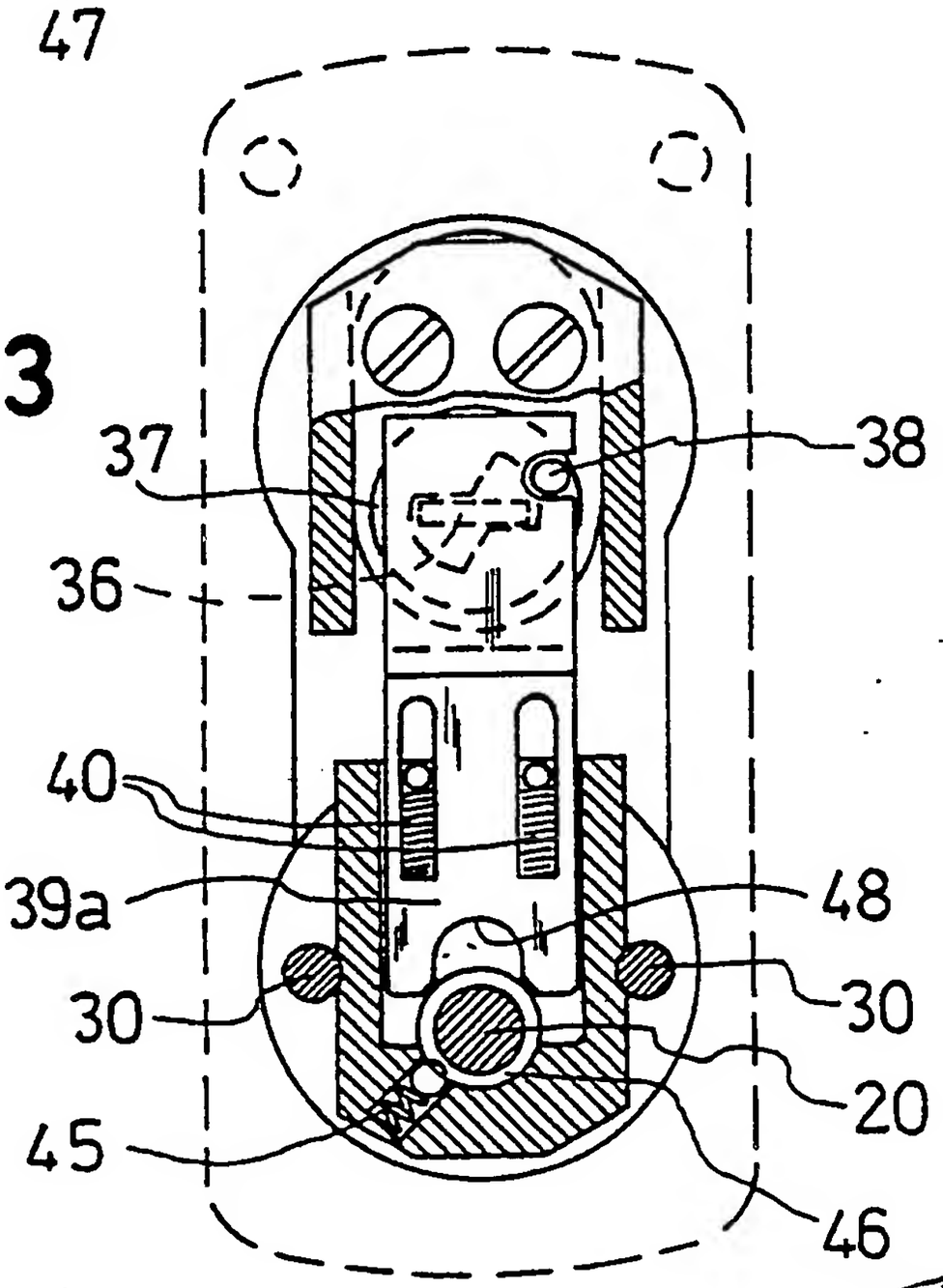


FIG. 13



INTERNATIONAL SEARCH REPORT

International Application No PCT/SE83/00406

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC 3

E 05 B 13/00, E 05 B 55/06

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC 3	E 05 B 3/00-04, 13/00-10, 55/04-16
Nat Cl	68a:51.55, 68/06
US Cl	70:208, 218-223, 149, 422, 129; 292:336.3

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

SE, NO, DK, FI classes as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category [6]	Citation of Document, [16] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
X	DE, C, 293 053 (G ASTON) 20 January 1915	1
Y	DE, C, 293 053 (G ASTON) 20 January 1915	1-9
X	SE, C, 124 331 (N KELFVE) 15 March 1949	1
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.../...

- [6] Special categories of cited documents: [15]
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IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
1984-02-01	1984 -02- 16
International Searching Authority [1]	**Signature of Authorized Officer [20]**
Swedish Patent Office	Christer Wendenius

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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)

Category *	Citation of Document, 16 with indication, where appropriate, of the relevant passages 17	Relevant to Claim No 18
Y	US, A, 4 047 408 (JOHNS ET AL) 13 September 1977	1-9
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